UCSC Climate & Energy Strategy: A Roadmap to Carbon Neutrality

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Climate & Energy Strategy

Scope

- Strategic Energy Plan
- Cap & Trade Strategy
- Techno-Economic Scenario Analysis Tool
Scenario Analysis Overview

INPUTS
Current and Projected Cost & Emissions Data

SCENARIOS
Create scenarios to address goals

SENSITIVITIES
Run sensitivities on scenarios

OUTPUTS
Generate reports/graphs & analyze results
Tool Screenshots

Scenario: Wedge Graph Test

- Total Reductions from meeting Zero Emission Light Duty Vehicle Acquisition Targets
- Offsets
- Purchased Biogas
- Greener Buildings
- Onsite Renewables
- Energy Efficiency
- Cogen Turndown
- TCR Scope 1 and 2 Emissions (MT CO2e)

*Note: scope 2 reductions from ESU 100% renewables are BAU and not broken out here*
Tool Screenshots

Scenario: RE1.5: PPA Costs +10% - MT CO2e Reduced between 2015 - 2055 by Measure Type

- RE - Scope 1: 3,294 (3%)
- EE - Scope 1: 4,673 (4%)
- CP - Scope 1: 10,420 (10%)
- RE - Scope 2: 4,732 (4%)
- EE - Scope 2: 79% (88,545)
- CP - Scope 2: 0
- Biogas - Scope 1: 0
- Voluntary Offsets: 0%
Tool Screenshots

Tool Screenshots


4a. Set Global Economic Assumptions

Discount Rate (default is 6%): 6.00%
Inflation Rate (default is 3%): 3.00%

4b. Set Energy Costs

Total Natural Gas Cost: $1.05 / therm
- Adjust Base Cost: $0.68
- Escalation Rate: 3.00%

Use Manual Yearly Values Instead?

Yes  No

Manual Yearly Values Are Currently: NOT USED

Total Electricity Cost: $0.14 / kWh
- Adjust Base Cost: $0.14
- Escalation Rate: 3.00%

Use Manual Yearly Values Instead?

Yes  No

Manual Yearly Values Are Currently: NOT USED

Upcharge

Include Utility Upcharge Cost: Yes
% of Usage Upcharge Applies To: 100%
Select Upcharge Cost Method: % of current cost
Upcharge Cost ($/therm): $0.08
Upcharge Cost (% of current cost): 50%
Current Upcharge Cost Used in Calculations: $0.35

4c. UC as Energy Service Provider - Scope 2 Emissions Factor

Include Utility Cost Upcharge: No
% of Usage Upcharge Applies To: 100%
Select Upcharge Cost Method: % of current cost
Upcharge Cost ($/kWh): $0.02
Upcharge Cost (% of current cost): 100%
Current Upcharge Cost Used in Calculations: $0.00
Key Findings - Campuswide Scenarios

The NPV of the recommended scenario (CW8), which achieves neutrality and minimizes Cap & Trade costs, has an NPV just under $11M through 2055.

<table>
<thead>
<tr>
<th>Scenario Abbreviated Name</th>
<th>Focus</th>
<th>Cap &amp; Trade Exit Year</th>
<th>2025 Neutrality</th>
<th>Scope 1+2 GHGs Reduced From Onsite Projects</th>
<th>NPV</th>
<th>Upfront Capital Outlay</th>
<th>Cost/MT CO2e</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW1.1</td>
<td>Deep onsite therm savings; optimized list of best payback measures from CW1</td>
<td>2018</td>
<td>X</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>-$28</td>
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<tr>
<td>CW3</td>
<td>Best onsite combo, No Carbon Neutrality</td>
<td>2021</td>
<td>X</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>-$138</td>
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<tr>
<td>CW8</td>
<td>Best onsite combo, Neutrality, 2021 Cap &amp; Trade Exit</td>
<td>2021</td>
<td>✓</td>
<td>●</td>
<td>▲</td>
<td>●</td>
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<tr>
<td>CW10</td>
<td>Best onsite combo, Neutrality, 2025 Cap and Trade Exit</td>
<td>2025</td>
<td>✓</td>
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<td>▲</td>
<td>●</td>
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<tr>
<td>CW11</td>
<td>Best onsite combo, No Carbon Neutrality, No Cap &amp; Trade Exit</td>
<td>NA</td>
<td>X</td>
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<td>▲</td>
<td>●</td>
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<tr>
<td>CW12</td>
<td>Business As Usual, Current EE implementation pace</td>
<td>NA</td>
<td>X</td>
<td>●</td>
<td>▲</td>
<td>●</td>
<td>-$175</td>
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</table>
**Key Findings - Renewable Energy**

Installing 4.8 MW of onsite renewable energy (3.3 MW main campus) creates $1.8M in economic value.

<table>
<thead>
<tr>
<th>Scenario Abbreviated Name</th>
<th>Focus</th>
<th>Cap &amp; Trade Exit Year</th>
<th>2025 Neutrality</th>
<th>Scope 2 GHGs Reduced From Onsite Projects</th>
<th>RE NPV</th>
<th>Upfront Capital Outlay</th>
<th>Cost/MT CO2a</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE1</td>
<td>Top 8 RE</td>
<td>NA</td>
<td>X</td>
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<td>-$150</td>
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<tr>
<td>RE1.1</td>
<td>Top 8 RE + Cogen Turndown to Avoid Export</td>
<td>NA</td>
<td>X</td>
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<td>-$153</td>
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<td>RE1.4</td>
<td>Top 8 RE, PPA Prices +10%</td>
<td>NA</td>
<td>X</td>
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<td>RE1.5</td>
<td>Top 8 RE, PPA Prices -10%</td>
<td>NA</td>
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<td>RE2</td>
<td>RE under current interconnection</td>
<td>NA</td>
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<td>RE3</td>
<td>Offsite RE Projects</td>
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<td>X</td>
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<td>-$138</td>
</tr>
</tbody>
</table>
Key Findings – Capital Projects

*Designing new construction projects to be as efficient as possible provides the most transformative, longest lasting emissions reductions*

*Note: scope 2 reductions from ESU 100% renewables & offsets not included*
Key Findings – Campus-wide Scenarios

Carbon neutrality at UC Santa Cruz can be achieved with a positive NPV because the savings from onsite renewable energy and energy efficiency projects is greater than the additional costs of carbon neutrality and exiting AB32.
# Key Findings – Campus-wide Scenario

<table>
<thead>
<tr>
<th>Scenario 2015-2055</th>
<th>Net-Present-Value ($MM)</th>
<th>Simple Payback (years)</th>
<th>Total Capital Costs ($MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best onsite projects, max. offsets to achieve neutrality</td>
<td>$11</td>
<td>3.25</td>
<td>$24</td>
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*Note: scope 2 reductions from ESU 100% renewables are BAU and not broken out here*